

The Local Distribution Conundrum in Catastrophic Events

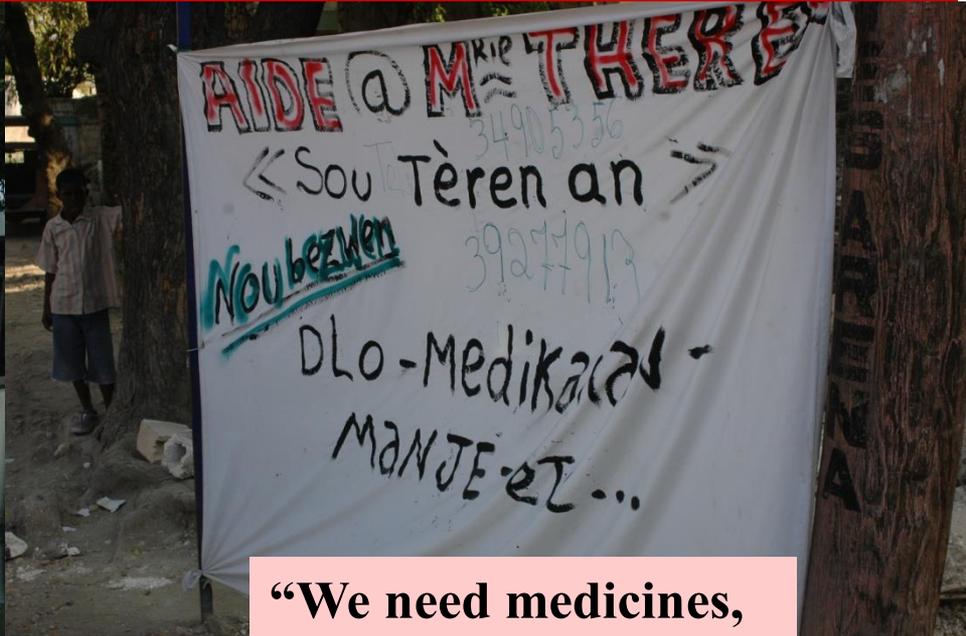
José Holguín-Veras,

William H. Hart Professor

**Director of the VREF Center of Excellence
for Sustainable Urban Freight Systems**

jhv@rpi.edu, Office 518-276-6221, Cell 518-221-7556

Our goal is to avert this...



“We need medicines, something to eat ...”



“We are asking for food, water, medicine, shelter and clothing. Aren't we humans?”



(Pictures taken by JHV 10 days after the disaster)

Major components of our work

- ❖ Fieldwork: 9/11, Katrina, Indian Ocean, Haiti, Chile, Joplin, Japan, Nepal, Ecuador, etc. etc.
- ❖ Diagnosis and characterization:
 - ❖ Causes of problems encountered
 - ❖ How humanitarian logistics take place
 - ❖ Quantification:
 - ❖ Aimed at obtaining empirical estimates
 - ❖ Provide support to analytical modeling
- ❖ Define mechanisms to improve response
 - ❖ Policy Suggestions → FEMA, Catastrophic Planning Groups
- ❖ Basic research on analytical modeling
 - ❖ To develop Decision Support Tools

The Top Ten Lessons Learned During Our Fieldwork...



The Top Ten...

- ❖ **Disaster Response is a Socio-Technical Process**
- ❖ **Disasters ≠ ≠ ≠ ≠ ≠ ≠ ≠ ≠ ≠ Catastrophes**
- ❖ Commercial Logistics ≠ ≠ ≠ Post-Disaster Logistics
- ❖ Controlling Material Convergence is a MUST
- ❖ In Catastrophes: **Local Distribution Is The Challenge**, Solution: **Collaborative Aid Networks**
- ❖ Effective Private Sector Integration is KEY
- ❖ Supply and Demand Are Very Dynamic, Be Ready
- ❖ Controlling Precautionary/Opportunistic Buying Helps
- ❖ Preventing Collapse of Private Supply Chains Helps
- ❖ Comprehensive Approaches Are Needed

Lesson #1: Disaster Response (DR) is More Than a Technical Problem...



DR is a Socio-Technical System (STS)... (1)



Lesson #2: Disaster and Catastrophes Are Not the Same...



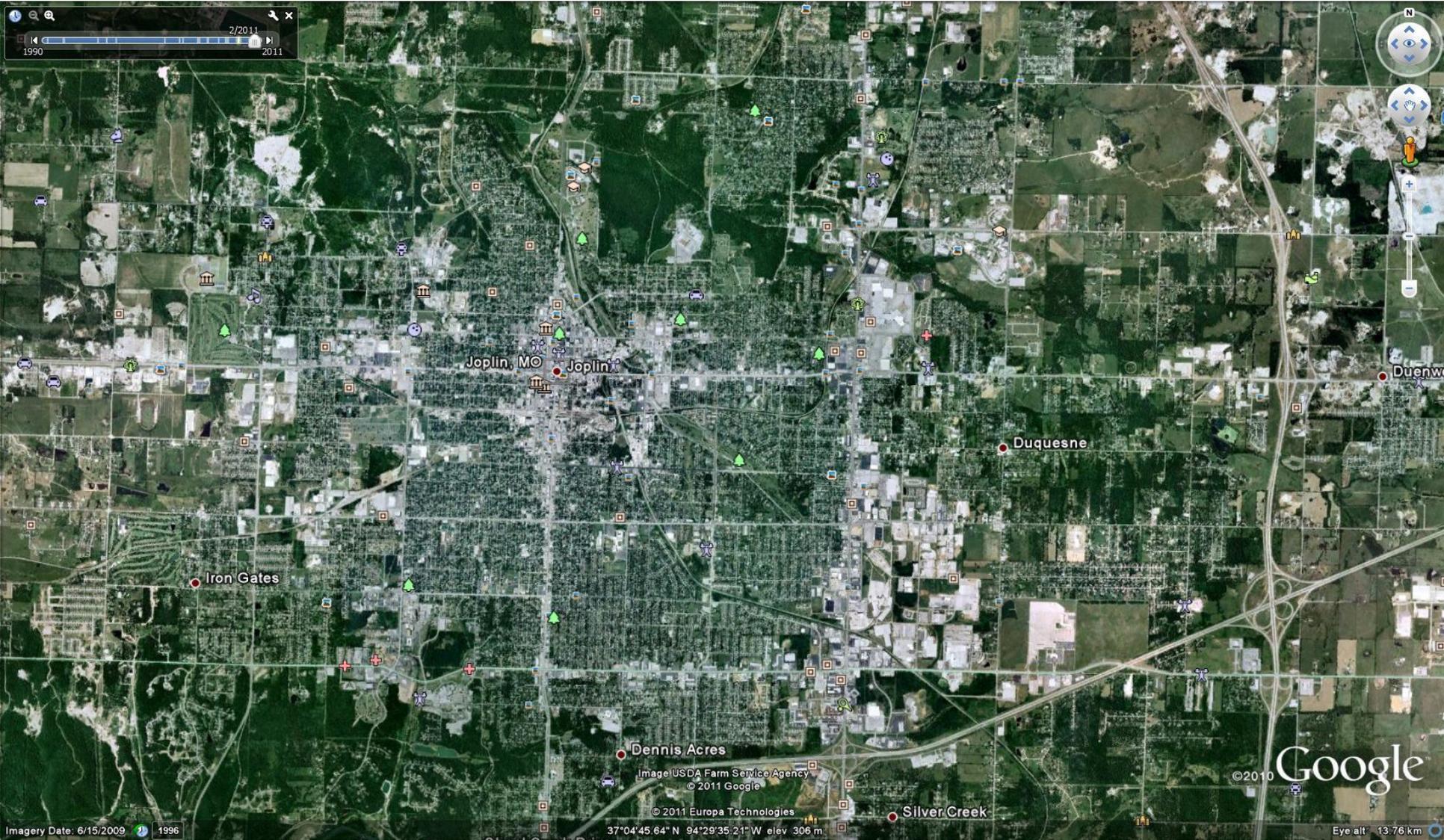
❖ Disaster:

- ❖ "...a non-routine event that exceeds the capacity of the affected area to respond to it in such a way as to save lives; to preserve property; and to maintain the social, ecological, economic, and political stability of the affected region..."

❖ Catastrophe:

- ❖ "most or all of the community-built structure is heavily impacted... [and] facilities and operational bases of most emergency organizations are themselves usually hit";
- ❖ **"local officials are unable to undertake their usual work role";**
- ❖ **"help from nearby communities cannot be provided";**
- ❖ **"most, if not all, of the everyday community functions are sharply and concurrently interrupted"**

Disaster: Joplin, Missouri (50,000 residents)



Disaster: Joplin, Missouri (160 deaths)

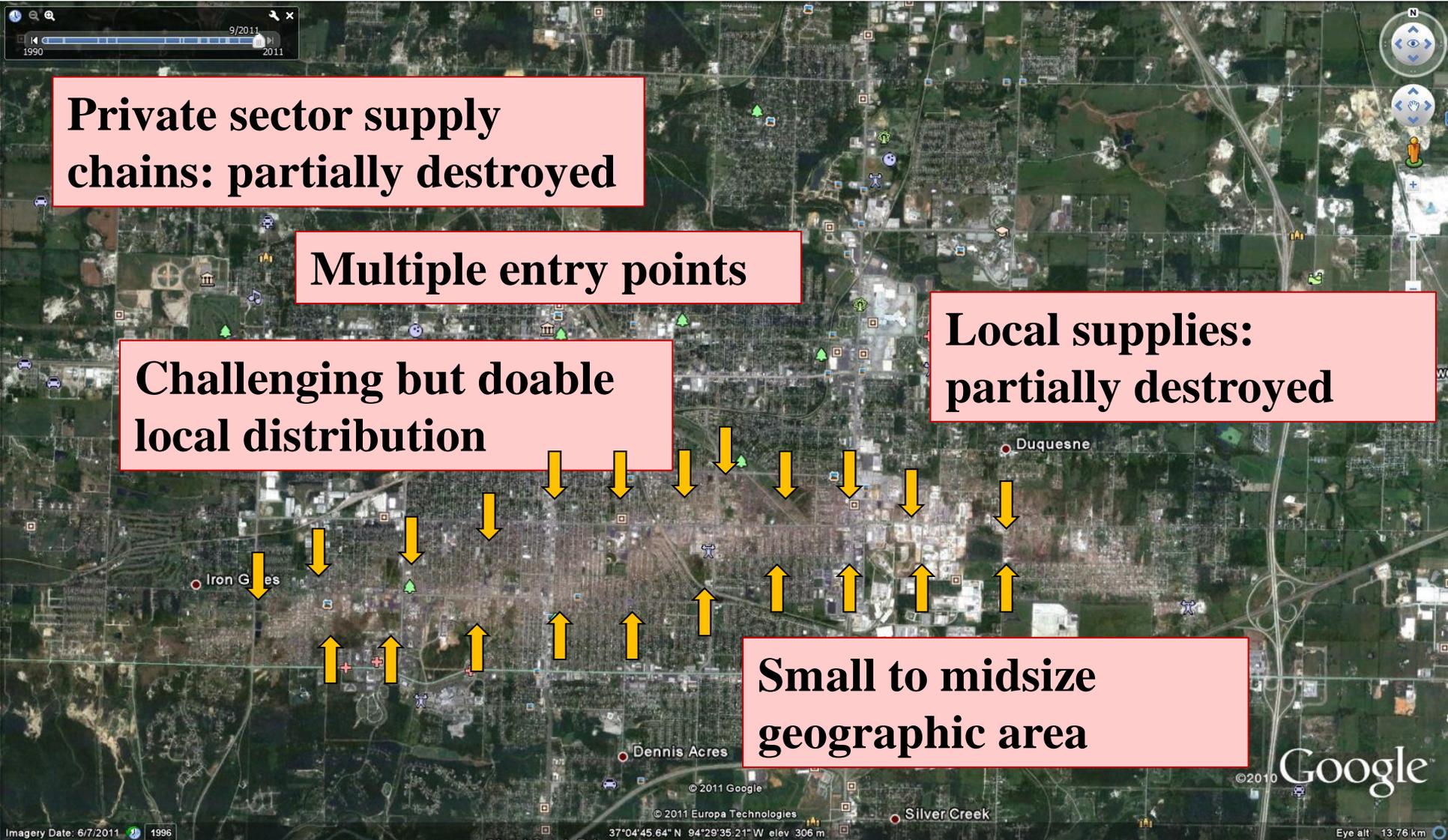
Private sector supply chains: partially destroyed

Multiple entry points

Challenging but doable local distribution

Local supplies: partially destroyed

Small to midsize geographic area



Catastrophe: Minami Sanriku (19,170 residents)



Minamisanriku, Motoyoshi District, Miyagi Prefecture, Japan

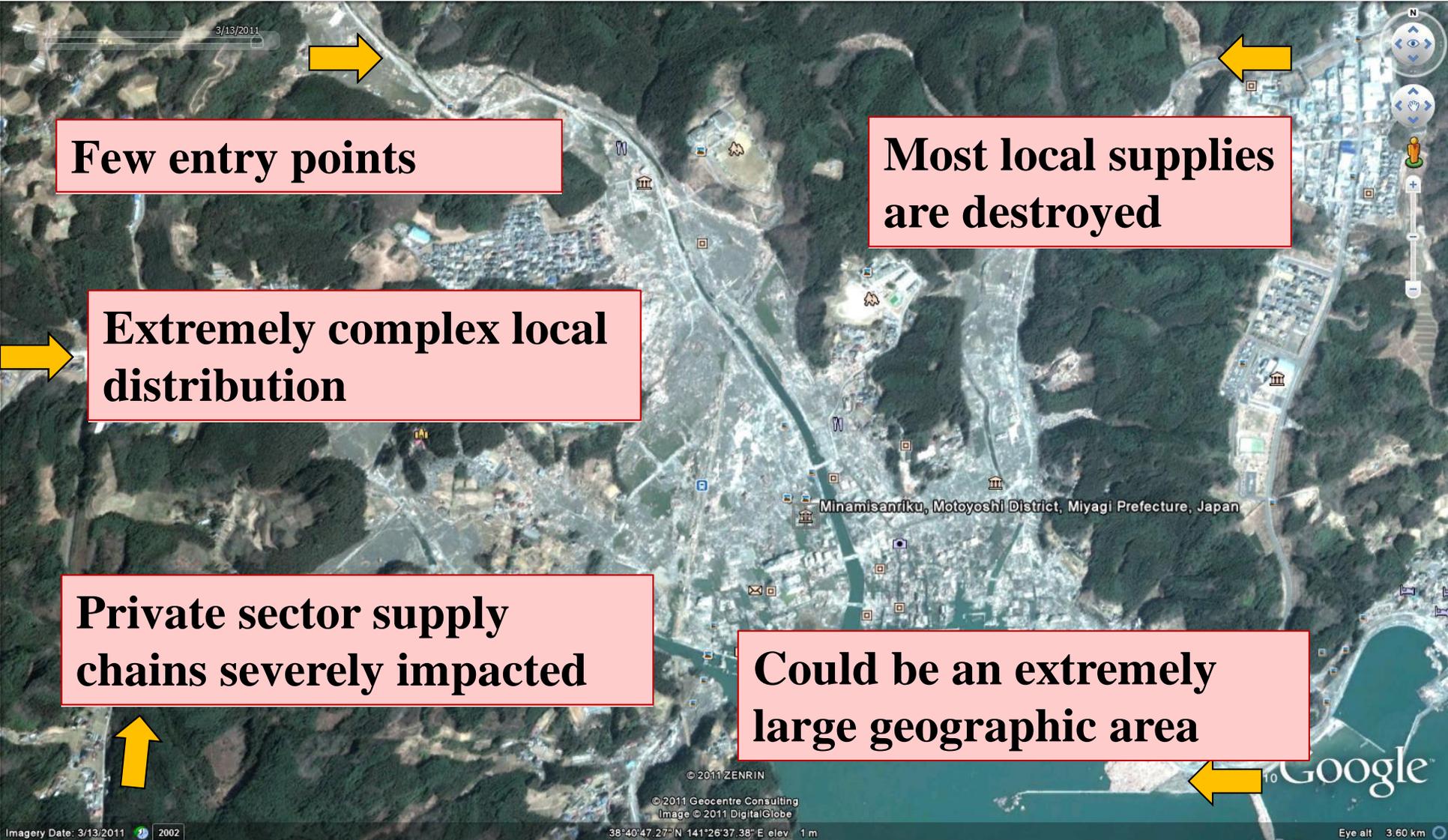
© 2011 ZENRIN
Image © 2011 GeoEye
© 2011 Geocentre Consulting

Imagery Date: 6/24/2010 2002

38°40'47.27"N 141°26'37.38"E elev 1 m

Eye alt 3.60 km

Catastrophe: Minami Sanriku (1,205 fatalities)



Few entry points

Most local supplies are destroyed

Extremely complex local distribution

Private sector supply chains severely impacted

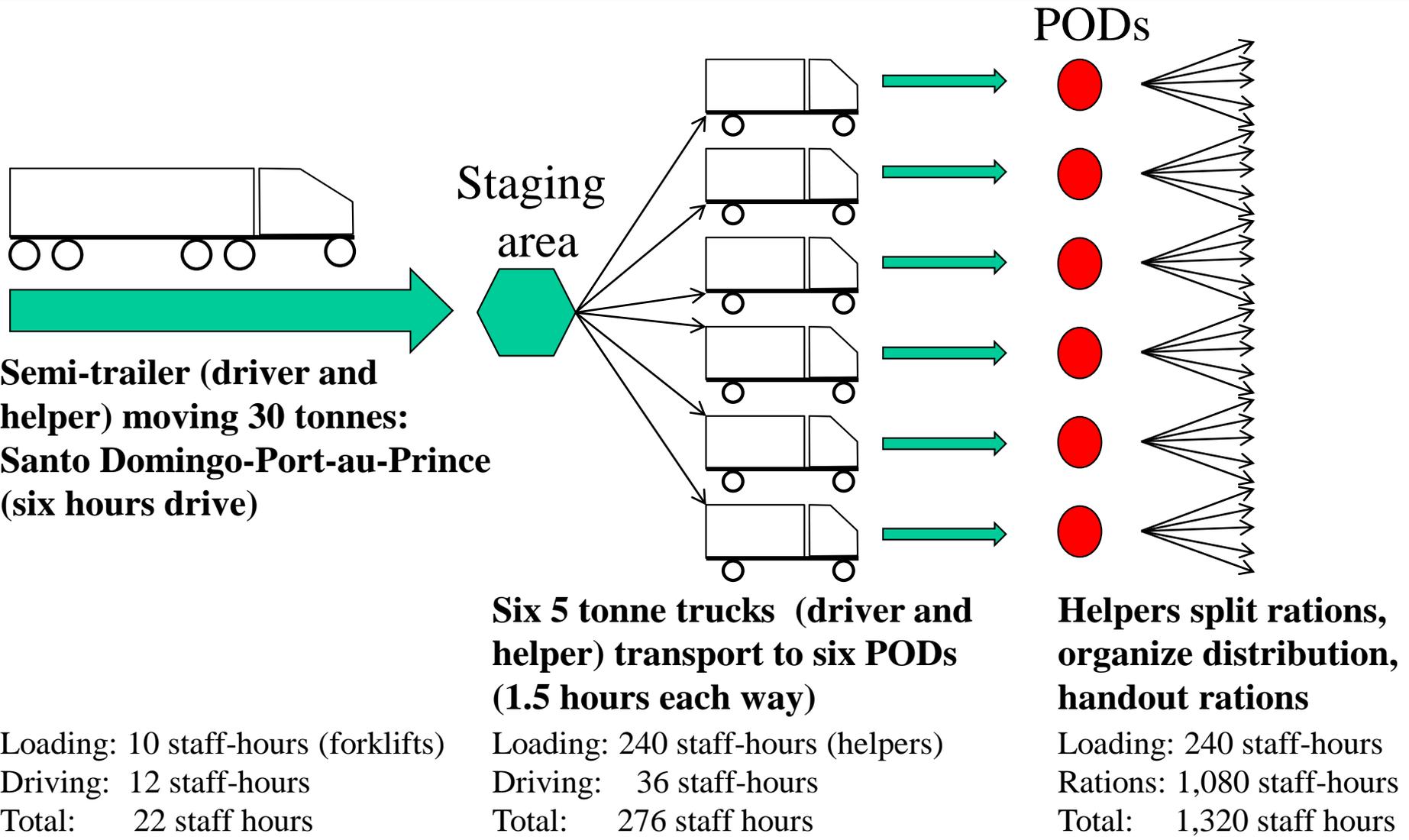
Could be an extremely large geographic area

Lesson #5-A:

In Catastrophic Events the Local Distribution Is
The Most Difficult Challenge... (1,2)



Resources (staff-hours) consumed (Haiti)



Relative manpower used → 1:12:60

Lesson #5-B: Only the Collaborative Aid Networks Can Do the Local Distribution Effectively (Haiti's Lesson) (2)



Why did this happen?

SUCCESSFUL BOND EXCHANGE,
AMAZING EMPLOYEE DEDICATION.



GET THE FACTS

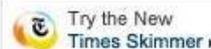
The New York Times

Sunday, January 17, 2010 Last Update: 10:50 AM ET

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Cartoons /
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Aid Arrives but Stalls in Haitian Chaos



Jae C. Hong/AP

◀ 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 ▶

People ran toward a U.S. helicopter as it made a water drop near a country club used as a base.

Access Limited by Damage in Capital

By GINGER THOMPSON and DAMIEN CAVE

A sprawling assembly of international officials and aid workers struggled to fix a troubled relief effort.

- Quake Ignores Class Divisions
- Clinton Goes to Haiti

Post a Comment | Read (200)

THE LEDE BLOG

10:21 AM ET | Information and calls for help continue to spread online.

10:05 AM ET | Doctors Without Borders is having trouble getting into the airport, which is effectively under U.S. control.

Looting Flares Where Authority Breaks Down

By SIMON ROMERO and MARC LACEY

The impulses for theft were borne of desperation and the lack of food and water as well as the absence of law.

- Satellite: Before and After
- A Haitian Literary Sampler

OPINION »

Clinton and Bush: A Helping Hand for Haiti

Bill Clinton and George W. Bush write about how aid can be delivered and why there are reasons to hope for Haiti's future.



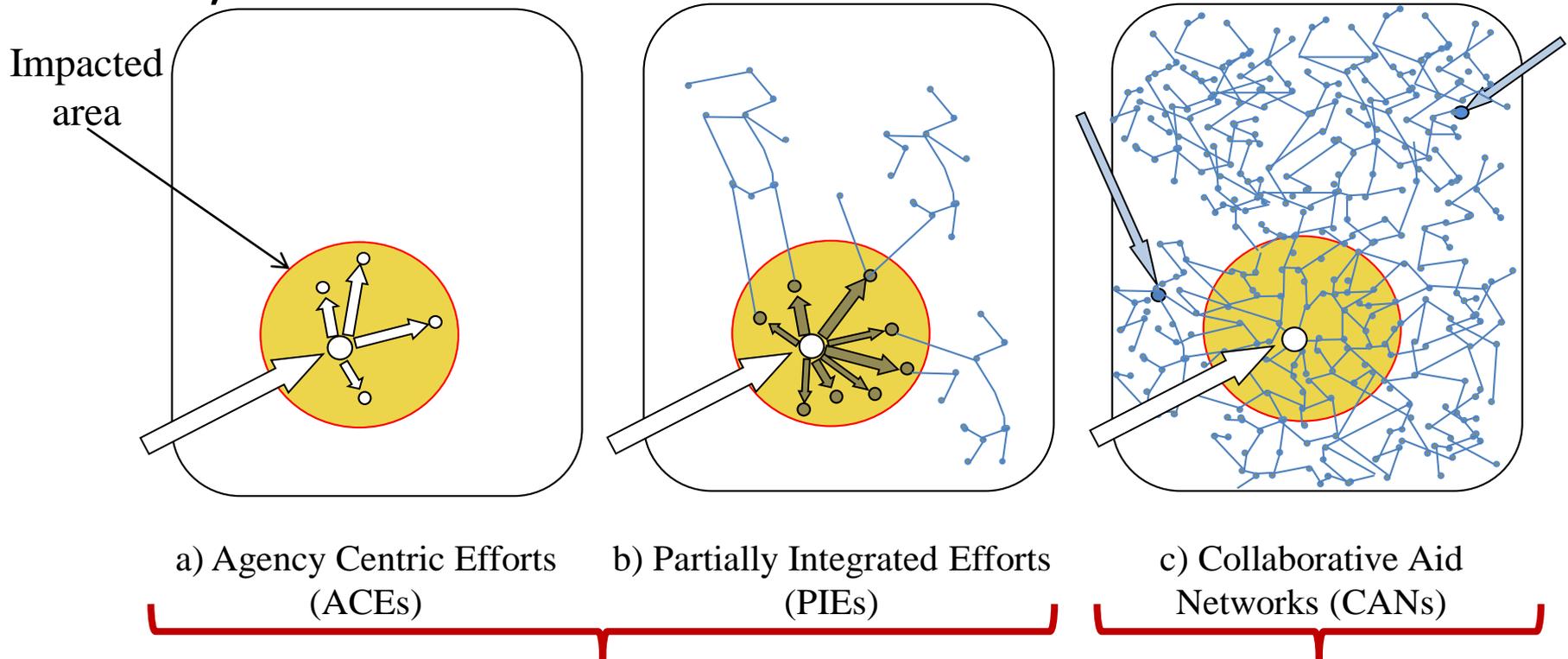
Stephen Crowley/The New York Times

- Op-Ed: Rebuilding Haiti
- Rich: Tea Party Rip-Off
- Dowd: An Odd Couple
- Kristof: Giving's Reward
- Friedman: Our Sputnik
- Editorial: Bank Reform



Emergent Humanitarian Logistic Structures

❖ Three structures emerge with vastly different network topologies: Agency Centric Efforts, Partially Integrated Efforts, and Collaborative Aid Networks



In catastrophic events, they are bound to fail
→ Too few PODs ...

This is what is needed: a large capillary network

ACEs/PIEs in action



CANs in action: Servicio Social de Iglesias



Implication

- ❖ After large catastrophic events, the most efficient way to distribute critical supplies at the local level is through the use of the existing social networks
- ❖ Extending the mission of these networks is easier than creating a network from scratch
- ❖ Outside efforts are doomed to be ineffective for distribution:
 - ❖ They are not geared for that, their strength is long-haul
 - ❖ Too many PODs are needed: cars are not an option, people cannot walk several miles to get supplies
 - ❖ Not enough man-power to man the PODs needed
 - ❖ Not enough local know-how



The Local Distribution Conundrum



The Heart of the Conundrum

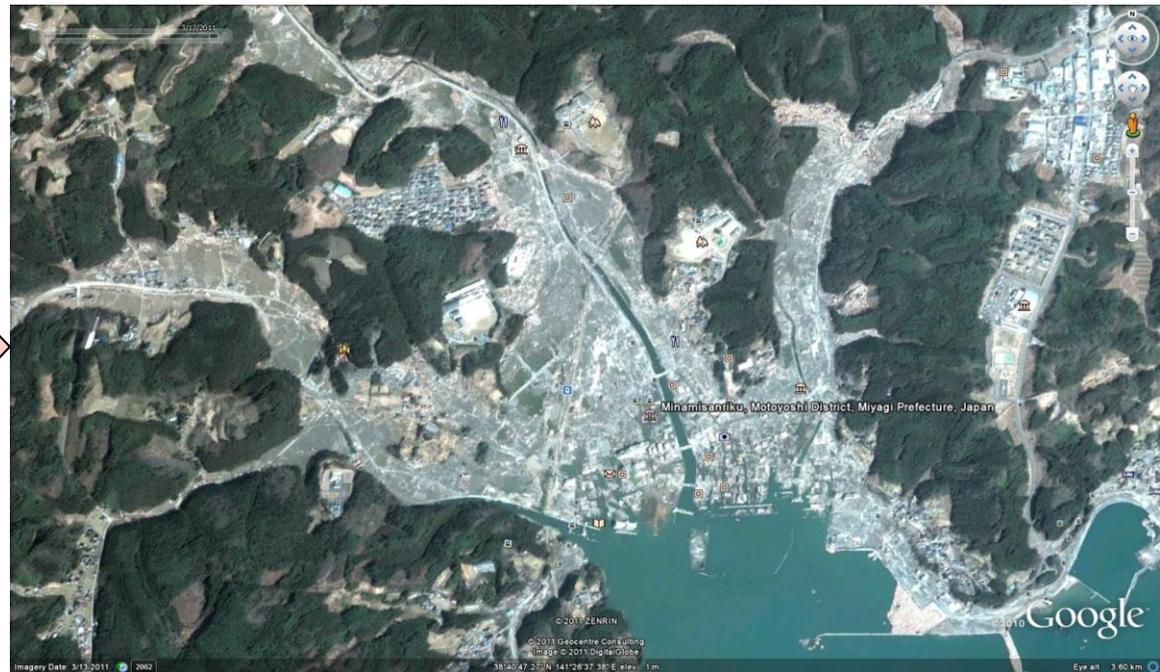
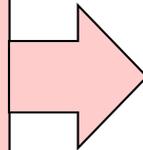
- ❖ **Chief Implication:** The local capacity to respond has been significantly compromised...
 - ❖ Local supplies have been destroyed
 - ❖ Communication/Financial networks are not fully operational
 - ❖ The outside help has not been able to connect with the local logistic networks... (the “truck” crisis...)
 - ❖ The local private sector cannot be expected to provide significant assistance ...
 - ❖ **“local officials are unable to undertake their usual work role”;**
- **The bulk of the help has to come from the outside...**



Current Response Framework Assumes...

- ❖ The locals are expected to fend by themselves during the first 48 hours...
- ❖ FEMA is expected to deliver within 72 hours to:
 - ❖ State and Local Governments
 - ❖ The local distribution of supplies is expected to be undertaken by the locals

In catastrophic events, the locals are not likely to be able to undertake the local distribution



How Big Is the Challenge?



The Major Challenge is the Local Distribution...

- ❖ The number, size, and location of PODs (has a huge impact in the wellbeing of beneficiaries)
 - ❖ Key → to have the right number of PODs, of the right size
 - ❖ Too few PODs lead to huge delays and suffering
 - ❖ Too many PODs, or PODs larger than needed → Waste
- ❖ Deciding on the optimal POD Network is not trivial
 - ❖ Data about needs are shaky, non-existent, or incomplete
 - ❖ The optimal configuration of the POD Network depends on the: level of difficulty to access the PODs, distance to the PODs, population density, cost of installing/ manning the PODs, risk faced by beneficiaries, etc. etc.
- ❖ Efficient and effective use of resources is essential



Result of an inadequate POD system...Haiti



Resources Required to Deliver Aid in PR

Input variables

Affected Population	1,700,000
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Estimate Optimal POD Configuration

POD Configuration

Number of PODs	334
Number of Servers/lanes per POD	8
Ration size (days of ration/beneficiary)	10

Resource requirements

Manpower	17,727
Supplies (tons)	34,000
Trucks	5,678

Logistics (direct) costs

Fixed cost for PODS	\$ 10,020,000
Manpower cost	\$ 42,545,481
Distribution cost to PODS	\$ 108,266,083

Indirect costs

Walking to POD	\$ 61,374,002
Waiting at POD	\$ 3,292,552
Replenishment of lost supplies	\$ 630
Keeping effort	\$ 3,442,500
Total Cost	\$ 228,941,247

❖ Estimated with the model developed by Jaller and HV

To Deliver Supplies to Puerto Rico

FOOD and WATER (11 pounds/day)

Input variables	100% needs	50% needs
Affected Population	3,410,000	1,700,000
Impacted Area (square miles)	3,515	3,515
POD Configuration		
Number of PODs	569	355
Number of Servers/lanes per POD	9	8
Ration size (days of ration/beneficiary)	10	10
Resource requirements		
Manpower	33,762	18,842
Supplies (tons)	15,500	7,727
Trucks	2,845	1,420

What is needed...

- ❖ A large deployment from the outside, e.g., National Guard to provide the backbone of the local distribution network...
- ❖ A parallel effort of local community organization to put in place the POD Network by...
 - ❖ Taking advantage of the Collaborative Aid Networks, e.g., religious organizations, civic groups...
 - ❖ Finding the trucks needed...(locally)
 - ❖ Locating the PODs in the right places...
 - ❖ Creating PODs with the right size...
 - ❖ Securing the local manpower needed...
 - ❖ Increasing the rations given to beneficiaries
- ❖ A parallel effort to re-start private sector supply chains

Questions?

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jhv@rpi.edu, Office 518-276-6221, Cell 518-221-7556



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